(D) Remarks

Amendment to the Specification

The specification has been amended to correct the error noted by the examiner.

Amendment to the Claims

Rejection under 112

Each of the claims rejected under Section 112 have been amended, and it is believed the basis for the rejections has now been overcome

Rejection under 103

Claims 1-7, 13-20, and 24-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's assertion and Partyka et al., U.S. Patent 6,131,071 issued October 10, 2000, and filed January 19, 1999, in view of Cox et al, "Maximum Entropy Analysis of Dispersed Seismic Signals", Geophysics, vol. 51, No. 12, December 1986, pages 2225-2234.

To the extent that the rejection is applicable to claim 1 as amended, the rejection is respectfully traversed. It is acknowledged that Partyka et al. teach "defining seismic data windows extending over selected portions of said group of spatially related seismic data traces; and generating a frequency spectrum of the seismic data within successively selected windows of said seismic data traces by applying a transform to said successively selected windows" as recited in claim 1. Although Partyka et al. teach the use of a Fourier transform for generating the frequency spectrum, Partyka et al. do suggest that a wide variety of discrete data transformations other than the Fourier can be used (column 38, lines 13-24), as stated in the Office Action.

Applicant respectfully disagrees, however, that there is any suggestion or teaching in Partyka et al. for:

> determining the frequency having the greatest amplitude within the frequency spectrum of the seismic data within said successively selected windows;

utilizing said determined frequencies having the greatest amplitude to generate a seismic display in which horizontal dimension represents distance and vertical dimension represents time, and

utilizing said seismic display to determine the presence of thin beds.

In the preferred embodiment taught in Partyka et al, the transformed data are examined for the presence of troughs in the frequency spectrum as indications of the presence of this beds. See, for example, the following locations in the Partyka et al. specification:

col. 7, lines 12 - 21

col.13, lines 8 - 22

col.13, lines 41 - 44

col. 20, lines 39 - 41

col. 20, lines 46 - 52

col. 20, lines 66 - 67

col. 21, lines 1 - 4

col. 21, lines 23 - 30

col. 25, lines 12 - 24

In only two locations in the Partyka et al. specification is there a suggestion for the use of any indication of thin beds, other than troughs in the frequency spectrum. In col. 25, beginning on line 67, there is a statement that:

The phase of the complex transform coefficients provides another means of identifying thin bed events and, more generally, lateral discontinuities in the rock."

And in column 32 there is a discussion beginning on line 19 and extending through line 50, that

"the change of spectral amplitude or phase with frequency is another seismic attribute that may be calculated from a tuning cube and may be of use in some exploration settings. . . . Computation of this attribute will tend to highlight those regions of the tuning cube wherein the phase changes most rapidly. In many cases, the most rapid change in phase will occur at frequency notches corresponding to thin-bed tuning

There is no teaching or suggestion of the use of the frequency having the greatest amplitude in the frequency spectrum as an indication of the presence of thin beds.

As noted in the Office Action, there is a brief discussion in the specification related to a location of maximum frequency in the frequency spectrum. However, this discussion is in a portion of the specification titled, "Alternative Tuning Cube Attribute Displays" which discusses a large number of seismic signal attributes that may be derived from a tuning cube, including the maximum frequency attribute. The following is a list of these other attributes that are discussed in the Partyka et al. specification:

- average spectral magnitude or phase,
- peak frequencies,
- location of maximum frequency,
- location of minimum frequency,
- amplitude at maximum frequency,
- amplitude at minimum frequency,
- average spectral amplitude,
- ratio between maximum and minimum frequency,
- ratio between the amplitude at the peak frequency and the amplitude at twice that frequency, and

Hilbert-transform related attributes such as

- instantaneous phase
- instantaneous amplitude,
- amplitude envelope,
- analytic signal, and
- change of spectral amplitude or phase with frequency.

In the discussion regarding the utility of these attributes, only one of the attributes, the "change in spectral amplitude or phase with frequency" is suggested for use in determining the location of thin beds.

Dr. David Monk, a widely recognized authority in the field to which this patent application is related, has reviewed the disclosure of the Partyka et al. patent. Dr. Monk states in the Declaration submitted herewith that he can find no teachings or suggestion of using the frequency having the greatest amplitude within a frequency spectrum in a seismic display and using that display for determining the location of thin beds.

There are no teachings or suggestion whatsoever in Partyka et al., whether taken alone or in combination with any of the other references, of "determining the frequency having the greatest amplitude within the frequency spectrum of the seismic data within said successively selected windows; utilizing said determined frequencies having the greatest amplitude to generate a seismic display in which horizontal dimension represents distance and vertical dimension represents time, and utilizing said seismic display to determine the presence of thin beds.

The claimed invention is being used as an instruction manual or template to piece together unrelated discussions from the Partyka et al. patent so that the claimed invention is rendered obvious. It is well known law that one such hindsight reconstruction is not permitted.

Claim 2 further distinguishes applicant's invention from the cited references by claiming a particular embodiment of the invention in which "the seismic display represents the frequency having the greatest amplitude within each frequency spectrum". Claim 5 claims another embodiment of the invention in which the amplitude of the frequency having the greatest amplitude is determines within each frequency spectrum and the seismic display represent said determined amplitudes. Claim 8 claims yet another embodiment of the invention in which for each generated frequency spectrum it is determined whether the peakedness of the generated frequency spectrum exceeds a selected value of peakedness and for each generated frequency spectrum for which the peakedness exceeds the selected value of peakedness, the frequency having the greatest amplitude is utilized to calculate bed thickness and the seismic display represents bed thickness.

Other claims dependent directly or indirectly from claim should be allowable for at least the reasons advanced with respect to claim 1.

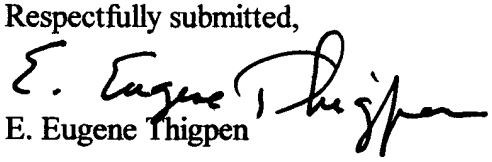
Independent claims 15 and 18 were rejected on substantially the same grounds as claim 1, and those rejections are traversed for the same reasons advanced with respect to claim 1. The scope of independent claim 15 is comparable to dependent claim 2 and specifies that it is the frequency having the greatest amplitude that is used to generate the seismic display. The scope of independent claim 18 is comparable to dependent claim 5 and specified that it is the amplitude of the frequency value having the greatest amplitude that is used in generating the seismic display.

Independent claim 21 is comparable to dependent claim 8, and includes the further distinction that the kurtosis is calculated for each frequency spectrum, and it is determined if the kurtosis exceeds a selected value. Frequency components having the greatest amplitude within the frequency spectra having a kurtosis value which exceeds the selected value of kurtosis are utilized to calculate bed thickness, and the calculated bed thickness is utilized to generate a seismic display.

Other claims not specifically discussed are dependent on the independent claims and should be allowed for at least the reasons advanced with respect to the independent claims.

In view of the foregoing amendments and remarks, reconsideration and allowance of the pending claims is respectfully requested. The invention as defined in the claims is neither anticipated nor obvious in view of the cited referenced, either alone or in combination. A Notice of Allowance is respectfully requested.

Respectfully submitted,



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